understood that the foregoing is intended to be merely illustrative and is not to be construed or interpreted as being restrictive or otherwise limiting of the present invention. Rather, the appended claims are to be construed to cover all equivalents falling within the scope and spirit of the invention.

We claim:

1. A cellulosic multi-ply paperboard comprising:

(a) predominantly cellulosic fibers;

(b) bulk and porosity enhancing additive interspersed with said cellulosic fibers in a controlled distribution throughout the thickness of said paperboard; and

(c) size press applied binder coating, optionally including a pigment adjacent both surfaces of the paperboard and penetrating into the board to a controlled extent; the overall fiber weight "w" of the paperboard being at least about 40 lbs./3000 square foot ream

(i) the distribution of the bulk and porosity enhancing additive throughout the thickness of the paperboard, and

(ii) the penetration of the size press applied pigment coating into the board, both being controlled to simultaneously produce at a fiber mat density of 3, 4.5, 6.5, 7, 8.3, and 9 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch respectively:

(A) a GM Taber stiffness of at least about 0.00716 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch; and

(B) at a fiber mat density of about 3 to 9 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, a GM tensile stiffness of at least 1890+24.2 w pounds per inch.

2. The multi-ply paperboard of claim 1 wherein at a fiber mat density of 3, 4.5, 6.5, 7, 8.3, and 9 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch respectively, the GM Taber stiffness is at least 0.00501 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and the GM tensile stiffness is at least 1323+24.2 w pounds per inch.

3. The multi-ply paperboard web of claim 2 wherein at a fiber mat density of 3, 4.5, 6.5, 7, and 8.3 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch respectively, the GM Taber stiffness is at least 0.0084 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00043 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00024 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00021 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and 0.00016 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch.

4. The multi-ply paperboard web of claim 3 wherein at a fiber mat density of 3, 4.5, 6.5, and 7 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch respectively, the GM Taber stiffness is at least 0.0084 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00043 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00024 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and 0.00021 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch.

5. The paperboard web of claim 3 or claim 4 wherein the fiber weight of the multi-ply paperboard is at least about 60 lbs./3000 square foot ream.

6. The cellulosic multi-ply paperboard of claim 5 wherein the bulk and porosity enhancing additive interspersed with said cellulosic fibers in a controlled distribution throughout the thickness of said paperboard comprises expanded and/or unexpanded microspheres.

7. The paperboard of claim 6 comprising a plurality of expanded or unexpanded microspheres in a proportion of between about 10 lbs. to about 400 lbs. per ton of fiber and a retention aid in an amount sufficient to retain a sufficient portion of the microspheres in all layers within the paperboard.

8. The paperboard of claim 7 wherein the microspheres have a mean diameter ranging between about 0.5 to 60 microns in the unexpanded state and having a maximum expansion of between about 4 and 9 times the mean diameters.

9. The paperboard of claim 7 wherein the retention aid is diallyldimethyl ammonium chloride polymer having a molecular weight in excess of ninety thousand.

10. The paperboard of claim 7 wherein the retention aid is polyethylenimine having a molecular weight of about forty thousand to two million.

11. The paperboard of claim 10 wherein the polyethylenimine has a molecular weight of about five hundred thousand to two million.

12. The paperboard web of claim 7 wherein the retention aid is selected from the group consisting of polyacrylomides, acrylamide-acrylate polymers, cationic acrylamide copolymers, and mixtures of these having a molecular weight in the range of one hundred thousand to thirty million.

13. The paperboard web of claim 12 wherein the retention aid has a molecular weight of about ten to twenty million.

14. The paperboard of claim 1 wherein the bulk and porosity enhancing additive interspersed with said cellulosic fibers in a controlled distribution throughout the thickness of said paperboard comprises a mixture of anfractuous cellulosic fiber subjected to thermal and/or chemical treatment and expanded or unexpanded microspheres.

15. The paperboard of claim 1 wherein the bulk and porosity enhancing additive interspersed with said cellulosic fibers in a controlled distribution throughout the thickness of said paperboard comprises a mixture of HBA fiber and expanded or unexpanded microspheres.

16. The paperboard of claim 1 wherein the bulk and porosity enhancing additive interspersed throughout the thickness of said paperboard comprise continuously or discontinuously coated expanded or unexpanded microspheres.

17. The paperboard of claim 1 wherein the paperboard has been coated with a binder and an inorganic or organic pigment.

18. An article of manufacture formed from the paperboard of claim 17.

19. The article of manufacture of claim 18 in the form of a carton.

20. The article of manufacture of claim 18 in the form of a folding paper box.

21. The paperboard of claim 17 wherein the binder is selected from the group consisting of aliphatic acrylate acrylonitrile styrene copolymers, n-butyl acrylate acrylonitrile styrene copolymer, n-amyl acrylate acrylonitrile styrene

copolymer, n-propyl acrylate acrylonitrile styrene copolymer, n-ethyl acrylate acrylonitrile styrene copolymer, aliphatic acrylate styrene copolymers, n-butyl acrylate styrene copolymer, n-amyl acrylate styrene copolymer, n-propyl acrylate styrene copolymer, n-ethyl acrylate styrene copolymer, cationic starch, anionic starch, amphoteric starch, starch latex copolymers, animal glue, gelatin, methyl cellulose, carboxymethylcellulose, polyvinyl alcohol, ethylene-vinyl acetate copolymer, vinyl acetate-acrylic copolymer, styrene-butadiene copolymer, ethylene vinyl chloride copolymer, vinyl acetate polymer, vinyl acetate-ethylene copolymer, acrylic copolymer, styrene-acrylic copolymer, stearylated melamine, hydrophilic epoxy esters, and mixtures of these.

22. The paperboard of claim **17** wherein the pigment is selected from the group consisting of a clay, chalk, barite, silica, talc, bentonite, glass powder, alumina, titanium dioxide, graphite, carbon black, zinc sulfide, alumina silica, calcium carbonate, and mixtures of these.

23. The paperboard of claim **22** wherein the pigment is kaolin clay.

24. A cellulosic cup formed from the paperboard of claim **1**.

25. A cellulosic plate formed from the paperboard of claim **1**.

26. The cellulosic plate formed from the paperboard of claim **17**.

27. The cellulosic plate of claim **25** in the form of a compartmented plate.

28. A cellulosic bowl formed from the paperboard of claim **1**.

29. A cellulosic canister formed from the paperboard of claim **1**.

30. A cellulosic rectangular take-out container formed from the paperboard of claim **1**.

31. A cellulosic hamburger clam shell formed from the paperboard of claim **1**.

32. A cellulosic French fry sleeve formed from the paperboard of claim **1**.

33. A cellulosic food bucket container formed from the paperboard of claim **1**.

34. An article of manufacture formed from the multi-ply cellulosic paperboard according to claim **1** wherein the bulk and porosity enhancing additive is in the form of expanded or unexpanded microspheres.

35. The article of manufacture of claim **34** wherein at a fiber mat density of 3, 4.5, 6.5, 7, 8.3, and 9 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch respectively, the GM Taber stiffness is at least 0.00501 $w^{2.63}$ grams-centimeters/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and the GM tensile stiffness is at least 1323+24.2 w pounds per inch.

36. The article of manufacture of claim **35** wherein at a fiber mat density of 3, 4.5, 6.5, 7, and 8.3 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, respectively, the GM Taber stiffness of the paperboard is at least 0.0084 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00043 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00024 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and 0.00021 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and 0.00016 $w^{2.63}$ grams-centimeter/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and the GM tensile stiffness is at least 1323+24.2 w pounds per inch.

37. The article of manufacture of claim **36** wherein at a fiber mat density of 3, 4.5, 6.5, and 7 pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch respectively, the GM Taber stiffness is at least 0.0084 $w^{2.63}$ grams-centimeters/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00043 $w^{2.63}$ grams-centimeters/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, 0.00024 $w^{2.63}$ grams-centimeters/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and 0.00021 $w^{2.63}$ grams-centimeters/fiber mat density$^{1.63}$ pounds per 3000 square foot ream at a fiberboard thickness of 0.001 inch, and the GM tensile stiffness is at least 1323+24.2 w pounds per inch.

38. The article of manufacture of claim **36** or claim **37** wherein the fiber weight of the paperboard is at least about 60 lbs./3000 square foot ream.

39. The article of manufacture of claim **38** in the form of a cup.

40. The article of manufacture of claim **38** in the form of a plate.

41. The plate of claim **40** in the form of a compartmented plate.

42. The article of manufacture of claim **38** in the form of a bowl.

43. The article of manufacture of claim **38** in the form of a canister.

44. The article of manufacture of claim **38** in the form of a rectangular take-out container.

45. The article of manufacture of claim **38** in the form of a hamburger clam shell.

46. The article of manufacture of claim **38** in the form of a French fry sleeve.

47. The article of manufacture of claim **38** in the form of a food bucket.

48. The article of manufacture of claim **36** or claim **37** coated on one or both sides with a coating resistant to moisture.

49. The article of manufacture of claim **48** in the form of a cup having an inner and outer surface which when filled with a liquid at 190° F., exhibits thermal insulative properties such that at room temperature and one atmosphere pressure the temperature of the outer surface does not reach a temperature of about 140° F.–145° F. in less than thirty seconds.

50. The cellulosic paperboard of claim **1** wherein the paperboard is coated with a grease resistant polymer including the fluorine moiety or is coated on one or both sides with a coating resistant to moisture.

51. The paperboard of claim **50** wherein one or both sides of the paperboard are coated with a chemical composition selected from the group consisting of polyolefin, nitrocellulose, methyl cellulose, carboxy methyl cellulose, ethylvinyl acetate copolymer, vinyl acetate copolymer, styrene butadiene copolymer, vinyl acetate copolymer, vinyl acrylic copolymer, styrene acrylic copolymer, and mixtures of these.

52. An article of manufacture made from the paperboard of claim **51**.

53. The article of manufacture of claim **52** in the form of a cup.

54. The cup of claim **53** having an inner and an outer surface which when filled with a liquid at 190° F. exhibits thermal insulative properties such that at room temperature

and one atmosphere pressure the outer surface does not reach a temperature of about 140° F.–145° F. in less than thirty seconds.

55. The article of manufacture of claim **52** in the form of a carton.

56. The article of manufacture of claim **52** in the form of a folding paper box.

57. The article of manufacture of claim **52** in the form of a plate.

58. The article of manufacture of claim **52** in the form of a compartmented plate.

59. The article of manufacture of claim **52** in the form of a bowl.

60. The article of manufacture of claim **52** in the form of a canister.

61. The article of manufacture of claim **52** in the form of a rectangular take-out container.

62. The article of manufacture of claim **52** in the form of a hamburger clam shell.

63. The article of manufacture of claim **52** in the form of a French fry sleeve.

64. The article of manufacture of claim **52** in the form of a food bucket.

65. The cup of claim **54** wherein one or both sides of the cup are coated with high density polyethylene.

66. The French fry sleeve of claim **63** prepared from the cellulosic paperboard of claim **50**.

67. The cellulosic paperboard of claim **1** wherein the paperboard is coated on one or both sides with a wax having a melting point of about 130° F. to about 150° F.

68. An article of manufacture prepared from the paperboard of claim **1** wherein the article of manufacture is coated with a wax having a melting point of about 130° F. to about 150° F.

69. The article of manufacture of claim **68** in the form of a cup.

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